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Please cancel claims 1-51 without prejudice or disclaimer.

Please add the following new claims

52. A method of improving congestion control of data packets transmitted over a communication network employing transmission control protocol (TCP), said packets transmitted from a source to a destination, said method comprising:

detecting an initial stage of congestion; and

determining the direction of said congestion by estimating the relative delay that one data packet experiences with respect to another data packet as said data packets are transmitted over said network.

53. A method as recited in claim 52, further comprising:

determining whether congestion is developing in a forward path; and

isolating forward throughput from congestion that may occur on a reverse path.

54. A method as recited in claim 53, further comprising:

in the absence of congestion in the reverse path, avoiding retransmission of data packets as a result of a timeout when there are a plurality of packet losses in a time window.

55. A method as recited in claim 52:

wherein said relative delay comprises increases and decreases in delay that said data packets experience with respect to each other; and

further comprising calculating said relative delay from a timestamp returned by a receiver of a data packet in an acknowledgment packet;

said timestamp specifying arrival time of a data packet at the receiver.

56. A method as recited in claim 55, further comprising determining the presence of multiple paths to a destination by timestamps returned from receivers of said data packets.

57. A method as recited in claim 52, further comprising determining whether congestion is increasing or decreasing in either a forward or reverse path.

58. A method as recited in claim 52, wherein determination of congestion direction allows that portion of the forward path to be isolated from events, or congestion, that may occur on the reverse path.

59. A method as recited in claim 52, wherein said source has a congestion window, and further comprising:

estimating the number of packets which reside in a bottleneck queue from said relative delay; and

keeping the number of packets in said bottleneck queue at a desired minimum by adjusting the congestion window of the source.

60. A method as recited in claim 52, wherein said TCP has an options field, and further comprising using said options field to detect the initial stage of congestion and determine the direction of congestion.

61. A method of improving congestion control of data packets transmitted over a communication network employing transmission control protocol (TCP), said packets transmitted from a source to a destination, said method comprising:

detecting an initial stage of congestion;

determining the direction of said congestion by estimating the relative delay that one data packet experiences with respect to another data packet as said data packets are transmitted over said network;

determining whether congestion is developing in a forward path; and

isolating forward throughput from congestion that may occur on a reverse path.

62. A method as recited in claim 61, further comprising:

in the absence of congestion in the reverse path, avoiding retransmission of data packets as a result of a timeout when there are a plurality of packet losses in a time window.

63. A method as recited in claim 61:

wherein said relative delay comprises increases and decreases in delay that said data packets experience with respect to each other; and

further comprising calculating said relative delay from a timestamp returned by a receiver of a data packet in an acknowledgment packet;

said timestamp specifying arrival time of a data packet at the receiver.

64. A method as recited in claim 63, further comprising determining the presence of multiple paths to a destination by timestamps returned from receivers of said data packets.

65. A method as recited in claim 61, further comprising determining whether congestion is increasing or decreasing in either a forward or reverse path.

66. A method as recited in claim 61, wherein said source has a congestion window, and further comprising:

estimating the number of packets which reside in a bottleneck queue from said relative delay; and

keeping the number of packets in said bottleneck queue at a desired minimum by adjusting the congestion window of the source.

67. A method as recited in claim 61, wherein said TCP has an options field, and further comprising using said options field to detect the initial stage of congestion and determine the direction of congestion.

68. A method of improving congestion control of data packets transmitted over a communication network employing transmission control protocol (TCP), said packets transmitted from a source to a destination, said method comprising:

detecting an initial stage of congestion;

determining the direction of said congestion by estimating the relative delay that one data packet experiences with respect to another data packet as said data packets are transmitted over said network;

said relative delay comprising increases and decreases in delay that said data packets experience with respect to each other; and

calculating said relative delay from a timestamp returned by a receiver of a data packet in an acknowledgment packet;

said timestamp specifying arrival time of a data packet at the receiver.

69. A method as recited in claim 68, further comprising:

determining whether congestion is developing in a forward path; and

isolating forward throughput from congestion that may occur on a reverse path.

70. A method as recited in claim 69, further comprising:

in the absence of congestion in the reverse path, avoiding retransmission of data packets as a result of a timeout when there are a plurality of packet losses in a time window.

71. A method as recited in claim 68, further comprising determining the presence of multiple paths to a destination by timestamps returned from receivers of said data packets.

72. A method as recited in claim 68, further comprising determining whether congestion is increasing or decreasing in either a forward or reverse path.

73. A method as recited in claim 68, wherein determination of congestion direction allows that portion of the forward path to be isolated from events, or congestion, that may occur on the reverse path.

74. A method as recited in claim 66, wherein said source has a congestion window, and further comprising:

estimating the number of packets which reside in a bottleneck queue from said relative delay; and

keeping the number of packets in said bottleneck queue at a desired minimum by adjusting the congestion window of the source.

75. A method of improving congestion control of data packets transmitted over a communication network employing transmission control protocol (TCP), said packets transmitted from a source to a destination, said method comprising:

detecting an initial stage of congestion;

determining the direction of said congestion by estimating the relative delay that

one data packet experiences with respect to another data packet as said data packets are transmitted over said network;

determining whether congestion is developing in a forward path;

isolating forward throughput from congestion that may occur on a reverse path; and

in the absence of congestion in the reverse path, avoiding retransmission of data packets as a result of a timeout when there are a plurality of packet losses in a time window.

76. A method as recited in claim 75:

wherein said relative delay comprises increases and decreases in delay that said data packets experience with respect to each other; and

further comprising calculating said relative delay from a timestamp returned by a receiver of a data packet in an acknowledgment packet;

said timestamp specifying arrival time of a data packet at the receiver.

77. A method as recited in claim 76, further comprising determining the presence of multiple paths to a destination by timestamps returned from receivers of said data packets.

78. A method as recited in claim 75, further comprising determining whether congestion is increasing or decreasing in either a forward or reverse path.

79. A method as recited in claim 75, wherein determination of congestion direction allows that portion of the forward path to be isolated from events, or congestion, that may occur on the reverse path.

80. A method as recited in claim 79, wherein said source has a congestion window, and further comprising:

estimating the number of packets which reside in a bottleneck queue from said relative delay; and

keeping the number of packets in said bottleneck queue at a desired minimum by adjusting the congestion window of the source.

81. A method as recited in claim 75, wherein said TCP has an options field, and further comprising using said options field to detect the initial stage of congestion and determine the direction of congestion.

82. A method of improving congestion control of data packets transmitted over a communication network employing transmission control protocol (TCP), said packets transmitted from a source to a destination, said method comprising:

detecting an initial stage of congestion;

determining the direction of said congestion by estimating the relative delay that one data packet experiences with respect to another data packet as said data packets are transmitted over said network;

determining whether congestion is developing in a forward path;

isolating forward throughput from congestion that may occur on a reverse path;

in the absence of congestion in the reverse path, avoiding retransmission of data packets as a result of a timeout when there are a plurality of packet losses in a time window;

wherein said relative delay compenses increases and decreases in delay that said data packets experience with respect to each other; and

calculating said relative delay from a timestamp returned by a receiver of a data packet in an acknowledgment packet;

said timestamp specifying arrival time of a data packet at the receiver.

83. A method as recited in claim 82, further comprising determining the presence of multiple paths to a destination by timestamps returned from receivers of said data packets.

84. A method as recited in claim 82, further comprising determining whether congestion is increasing or decreasing in either a forward or reverse path.

isolating forward throughput from congestion that may occur on a reverse path;

in the absence of congestion in the reverse path, avoiding retransmission of data packets as a result of a timeout when there are a plurality of packet losses in a time window;

wherein said relative delay comprises increases and decreases in delay that said data packets experience with respect to each other; and

calculating said relative delay from a timestamp returned by a receiver of a data packet in an acknowledgment packet;

said timestamp specifying arrival time of a data packet at the receiver.

83. A method as recited in claim 82, further comprising determining the presence of multiple paths to a destination by timestamps returned from receivers of said data packets.

84. A method as recited in claim 82, further comprising determining whether congestion is increasing or decreasing in either a forward or reverse path.

85. A method as recited in claim 82, wherein said source has a congestion window, and further comprising:

estimating the number of packets which reside in a bottleneck queue from said relative delay; and

keeping the number of packets in said bottleneck queue at a desired minimum by adjusting the congestion window of the source.

86. A method as recited in claim 82, wherein said TCP has an options field, and further comprising using said options field to detect the initial stage of congestion and determine the direction of congestion.